

CLAIMS

1. A label comprising:
 - (A) a polymer facestock having an upper surface and a lower surface,
 - (B) a nano-porous layer having an upper surface and a lower surface wherein the upper surface of the nano-porous layer underlies the facestock, and the nano-porous layer contains pores having an average diameter of from about 1 to about 100 nm and has a pore volume of from about 0.1 to about 2 ml./g., and
 - (C) a metal layer overlying the upper surface of the facestock or underlying the facestock between the facestock and the nano-porous layer, said metal layer having an upper surface and a lower surface.
2. The label of claim 1 wherein the pore volume of the nano-porous layer is from about 0.1 to about 1.2 ml/g.
3. The label of claim 1 wherein the metal of the metal layer is selected from the group of tin, chromium, nickel, stainless steel, copper aluminum, indium, gold, silver, and alloys thereof.
4. The label of claim 1 wherein the metal is aluminum.
5. The label of claim 1 further comprising an adhesion promoting layer between the upper surface of the facestock and the metal layer.
6. A label comprising:
 - (A) a polymer facestock having an upper surface and a lower surface,
 - (B) a nano-porous layer underlying the facestock and having an upper surface and a lower surface, wherein the nano-porous layer comprises a binder and nano-sized inorganic particles, and the nano-porous layer contains pores having an average diameter of from about 1 to about 100 nm and the layer has a pore volume of from about 0.1 to about 2 ml./g., and

(C) a metal layer overlying the upper surface of the facestock, said metal layer having an upper surface and a lower surface.

7. The label of claim 6 wherein the pore volume of the nano-porous layer is from about 0.1 to about 1.2 ml/g.

8. The label of claim 6 wherein the nano-porous layer mixture is prepared by mixing a binder with inorganic particles having an average primary particle diameter of from about 5 to about 100 nm.

9. The label of claim 6 wherein the mixture is prepared by mixing a binder with inorganic particles having an average primary particle diameter of from about 5 to about 40 nm.

10. The label of claim 6 wherein the nano-porous layer contains from about 70% to about 95% by weight of the inorganic particles.

11. The label of claim 6 wherein the thickness of the nano-porous layer is from about 5 to about 30 microns.

12. The label of claim 6 wherein the inorganic particles include colloidal silica, colloidal alumina, silica-alumina composite sols, nano-size silica gel, nano-size titanium dioxide, nano-sized calcium carbonates, or mixtures thereof.

13. The label of claim 6 wherein the inorganic particles include colloidal alumina.

14. The label of claim 6 wherein the binder comprises at least one resin selected from polyurethanes, polyolefins, polyacryls, polymethacryls, polyamides, rubbers, polyvinyl acetates, polyvinyl alcohols, polyvinyl ethers, polyacrylonitriles,

polystyrenes, polyvinyl pyrrolidones, polyvinyl chlorides, poly (alkylene oxides), proteins, cellulosic polymers, gelatin, and copolymers of one or more monomers including olefins, (meth) acrylates, vinyl acetates, allyl acetates, vinyl chlorides, acrylonitriles, N-vinyl pyrrolidones, N-vinyl oxazolidones, vinyl ethers and other allylic and vinylic monomers.

15. The label of claim 6 wherein the upper surface of the polymer facestock is corona treated or flame treated.

16. The label of claim 6 further comprising an adhesion promoting layer between the lower surface of the facestock and the upper surface of the nano-porous layer.

17. The label of claim 6 further comprising an adhesion promoting layer between the upper surface of the facestock and the lower surface of the metal layer.

18. The label of claim 6 also comprising a print layer overlying the upper surface of the metal layer.

19. The label of claim 18 further comprising a transparent protective layer overlying the print layer, said protective layer comprising a polymer, and said protective layer having anti-static properties.

20. The label of claim 18 further comprising a transparent abrasion, chemical, and/or ultraviolet resistant layer overlying the print layer.

21. The label of claim 18 further comprising an adhesion promoting layer between the upper surface of the metal layer and the print layer.

22. The label of claim 1 also comprising (D) a water-based adhesive in contact with the lower surface of the nano-porous layer.
23. The label of claim 22 wherein the water-based adhesive is based on starch, casein, synthetic polymers or blends thereof.
24. The label of claim 6 also comprising (D) a water-based adhesive in contact with the lower surface of the nano-porous layer.
25. The label of claim 24 wherein the water-based adhesive is based on starch, casein, synthetic polymers or blends thereof.
26. A labeling process comprising providing a substrate surface and a label of claim 53, applying a water-based adhesive to the lower surface of the nano-porous layer of the label, applying the side of the label to which the adhesive has been applied to the substrate surface, and allowing the label to dry on the substrate surface.
27. The labeling process of claim 26 wherein the substrate is glass, plastic or metal.
28. The labeling process of claim 26 wherein the substrate is a container.
29. The labeling process of claim 28 wherein the container is a glass container.
30. The labeling process of claim 28 wherein the container is a plastic container.
31. The labeling process of claim 26 wherein the water-based adhesive is based on starch, caseine, synthetic polymers, or blends thereof.

32. The labeling process of claim 26 wherein the adhesive comprises an emulsion having a solids content of at least about 40% by weight.

33. The labeling process of claim 28 wherein the container is a container for food, drink or a household product.

34. A labeling process comprising providing a substrate surface and a label of claim 58, applying a water-based adhesive to the lower surface of the nano-porous layer of the label, applying the side of the label to which the adhesive has been applied to the substrate surface, and allowing the label to dry on the substrate surface.

35. The labeling process of claim 34 wherein the substrate is glass, plastic or metal.

36. The labeling process of claim 34 wherein the substrate is a container.

37. The labeling process of claim 36 wherein the container is a glass container.

38. The labeling process of claim 36 wherein the container is a plastic container.

39. The labeling process of claim 34 wherein the water-based adhesive is based on starch, caseine, synthetic polymers, or blends thereof.

40. The labeling process of claim 34 wherein the adhesive comprises an emulsion having a solids content of at least about 40% by weight.

41. The labeling process of claim 34 wherein the container is a container for food, drink or a household product.